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## SUGGESTIONS

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FOR

## PREVENTING THE SPREAD OF DIPHTHERIA.

*A Circular from the State Board of Health, Lunacy and Charity.*

THE evidence with regard to the origin of diphtheria at present seems to show conclusively that the disease sometimes develops spontaneously, its origin being a miasm, and particularly in certain conditions of filth: that it is more fatal where the soil is damp and chilly, especially on high land retaining moisture; that its fatality is increased and its spread favored by the presence of filth in the water used for drinking and particularly in the air breathed: that, like other diseases of its class, its epidemic prevalence depends upon conditions of air, soil, etc., which are at present unknown: that from 80 to 90 per cent of the deaths are of children under ten years of age: that all the circumstances giving rise to the various forms of ill health predispose to it, and finally that it is *contagious and infectious*, often in the highest degree. It is thought that closer contact with the air, person, or thing infected is necessary in order to produce the disease than in the case of small-pox, scarlet-fever and measles. The discharges and exhalations from the nose and mouth are particularly dangerous.

Whether or not diphtheria is another form of the disease which is usually called membranous croup, it is certain that the two cannot always be distinguished at the bed-side or in the autopsy room, and that what had been supposed to be the milder disease has been the means of communicating the most virulent diphtheria. All cases of diphtheria and croup should therefore be treated by the health officer with similar precautions.

The means of transporting the contagium of diphtheria may be furnished by any thing that has come in contact with an infected person or object,—air, food, clothing, sheets, blankets, whiskers, hair, furniture, toys, library-books, wall-paper, curtains, cats, dogs, &c. Funerals have occasionally spread the disease, the exhalations from the dead body being especially dangerous.

The period from exposure which results in diphtheria, to the time when the symptoms manifest themselves varies from several hours to two weeks. The average time is variously given from two to five days.

A physician's certificate of recovery from diphtheria should always be required before attendance at school from the household infected is allowed.

It would be well to designate every house where diphtheria exists, by some mark not too conspicuous, and yet sufficient to give the proper information.



The first principle of treatment is isolation, which can be nowhere so well observed as in a hospital, provided the patient can go there. Otherwise he should be placed in a room as much separated from the rest of the house as possible, and communicate with no more members of the household than is necessary. If an outward draught of air from the sick-room to the entry occurs, a curtain may be formed by a sheet over the door, moistened with a solution of nitrate of lead.

The sick-room should be well warmed and ventilated (by an open fireplace with a fire or a lamp in it, if possible). It should be cheerful, open to the sun, free from noise, dust, &c., and not "aired" by cold draughts, which are often more dangerous than a foul atmosphere.

Carpets, upholstered furniture, window-hangings, and indeed all unnecessary objects, especially woollen, which cannot be readily destroyed or disinfected, should be removed from the room. Bits of carpet may be used and burned after the need for them has passed.

The discharges from the throat, nose and mouth of the patient may be put in a vessel containing a strong solution of some "disinfectant," which shall be frequently washed with hot water: they should not be received upon any thing which is to be kept. Pieces of soft cloth may be used in place of pocket-handkerchiefs, and then at once burned. The breath should be kept as pure as may be, by cleansing gargles and washes for the mouth (chlorinated soda, permanganate of potash, &c.). The discharges from the kidneys and bowels should be disinfected with a strong solution of chloride of zinc. Carbolic acid may be added as a "disinfectant" to the slops, and to the water in which the patient has washed or bathed, before throwing it out. The bed-clothes, towels, &c., when disused, should be removed with proper care, placed in a hot disinfecting solution,\* and be boiled for a couple of hours. The food left uneaten should never be carried where it may infect other persons.

While the sick-room is occupied, it is doubtful whether any *disinfectant* can be used of sufficient strength to destroy the contagium. Many substances, however, do destroy organic matter by oxidation, and in that way at least contribute to cleanliness if nothing more. For that purpose it is desirable to use nitrate of lead, chlorinated soda, chloride of zinc, permanganate of potash, &c., because they have no unpleasant smell of themselves.

Attendants on the sick should be as few as possible, and should not communicate with other persons any more than can be helped. They should wear only such clothing as may be readily washed. Clothes used in the sick-room should be boiled before being worn elsewhere. Gargling or washing the mouth occasionally with a cleansing fluid is a useful measure for those who must be exposed to contagion; and in washing the hands, a little Condyl's fluid (permanganate of potash) may be placed in the basin.

After recovery, the patient should not mingle with other persons, use lounges, carriages, public rooms, &c., liable to be used by others, until he has quite recovered and until he has taken warm baths for several days.

After the sick-room is no longer needed as such, all the clothing and other matters used in it, that can be washed, should be disinfected\* and soaked in boiling water; others should be placed in a hot-air chamber, and kept at a temperature of 240° F. for several hours. Any articles of trifling value may be destroyed by fire. The room should be closed as tight as

\*A mixture of four ounces of sulphate of zinc and two ounces of common salt, to a gallon of water, is recommended by the Commission acting under the direction of the National Board of Health. Chlorinated soda solution is useful, especially when soap is also used.



possible, and sulphur burned in it; it should be kept closed six hours, and then opened for several days to the air and sunshine. The floor and wood-work should then be thoroughly washed with soap and hot water. Scraping and re-painting would not be considered an excess of caution in time of epidemics, when the wall-paper should be soaked with carbolic acid, removed and burned, and the ceiling should be washed with soap and hot water, or scraped.

Should the patient die, the body ought not to be removed from the sick-room until it has been tightly sealed in the coffin, with chloride of lime, carbolized earth, or some similar agent. It is advisable that *the funeral should be as private as possible*, and not attended by children.

Filth is one of the chief predisposing causes of diphtheria, whether in contaminated water-supplies or foul air from privies, cesspools, sink-spouts, unventilated soil-pipes, drains or water-closets, etc. Perfect cleanliness should therefore be enjoined. Sewer-gas, of course, is a kind of filth which may bring to one person's chamber, if it has access thereto, the contagium brought from another chamber and not disinfected. Overcrowding is one of the most active ways of propagating contagious disease. Finally, *fresh air* is one of the best disinfectants.

In our State, there is a local board of health in every town, although in too many cases consisting of a body of men who are sufficiently occupied with other duties, and who in their character of selectmen act *ex officio* as guardians of health. To each one of these boards the law gives full authority to take every step that is needed in the preventive measures to be adopted in case of diphtheria. The sections with regard to isolation are from Chapter 26 of the General Statutes, and as follows:—

SECTION 47. When a householder knows that a person within his family is taken sick of . . . any . . . disease dangerous to the public health, he shall immediately give notice thereof to the . . . board of health of the town in which he dwells. If he refuses or neglects to give such notice, he shall forfeit a sum not exceeding one hundred dollars.

SECTION 48. When a physician knows that any person whom he is called to visit is infected with . . . any disease dangerous to the public health, he shall immediately give notice thereof to the . . . board of health of the town; and if he refuses or neglects to give such notice he shall forfeit for each offence a sum not less than fifty nor more than one hundred dollars.

The Board of Health of Boston at present requires small-pox, scarlet-fever, diphtheria and typhus-fever to be reported to them. Sufficient power is given to school committees, as well as to Boards of Health, to restrict the attendance at school of children from infected houses.

These rules for the prevention of diphtheria should be carried out *under the direction of physicians or boards of health*.

The Board is fully aware that many individual cases of diphtheria occur without any spread of the disease; but during epidemics at least the rule is to the contrary, and there are no means of knowing what is safe, without taking precautions which a different course might, occasionally, have proved to be unnecessary.



## DISINFECTION.

So far as diphtheria is concerned, it may be said that *moisture* renders low organisms generally, and their "germs," more readily destructible by chemical means. In the absence of definite experiments as to the destructibility of the diphtheria poison, it would be an additional and wise precaution to sprinkle with water the rooms, etc., to be fumigated.

Effective disinfection, by burning sulphur, requires eighteen ounces to each space of one thousand cubic feet. The sulphur should be broken in small pieces, burned over a vessel of water or sand, so as to avoid danger from fire, and, if the room is large, it should be put in separate vessels in different places. The room should be tightly closed for six hours and then aired; it is better that the room should be warm than cold. Of course efficiently disinfected air is, during the process of disinfection, irrespirable. Most articles may be disinfected in this way, if hung up loosely in the fumigated chamber, although it would be an additional safeguard to expose any thing thick, like a bed-mattress, to prolong heat at a temperature of about 240° F.; and, indeed, *heat* must, with our present knowledge, be considered *the best disinfectant*. With this end in view, local boards of health are advised to procure furnaces and laundries, as is commonly done in other countries, to be used for the sole purpose of disinfecting articles which have been exposed to the infectious diseases, as recommended in the Ninth Annual Report of the State Board of Health, and described by Dr. A. H. JOHNSON in an exhaustive paper on Scarlet-Fever (pp. 255 *et seq.*), in that report. Of course, a much simpler disinfecting furnace than that described will answer every purpose. For ordinary use, in disinfecting *houses*, the sulphur process is the best.

The following articles were found uninjured after several hours' exposure to an atmosphere in which sulphur had been burned in the proportion given above: a clock of steel and brass; rusty and clean nails; gold and silver money; a military epaulet; various colored silk articles; a colored rug; calico; down pillows; a gilt-framed looking-glass; books; water in an uncorked bottle; flour; meat; salt; bread; apples; cinnamon; vanilla; cigars; wall-paper; oil-paintings; varnished articles; gas fixtures; water fixtures; a highly polished razor had a slightly cloudy appearance on its upper side, but that was easily rubbed off. The flour and meat were cooked and eaten, and the cigars were smoked, without any abnormal taste or smell being observed; in the bread not all of the observers noticed a slightly acid taste; the inside portion of the apples was unchanged, the skin was slightly sour; the water, after standing, had an acid reaction, but no decided taste or smell. Litmus paper placed between the leaves of books and under a carpet was turned bright red. Many of the articles exposed had a decided smell of sulphur at first, but that soon disappeared.

A solution of chloride of zinc (one part of Burnett's Disinfecting Fluid to two hundred of water), very quickly kills bacteria *which have been placed in it*, and arrests putrefaction. Caustic lime serves equally as well (1 to 100), but leaves a sediment not always easy to remove. Carbolic acid, in sufficient strength to be effective (1 to 100), is more expensive and of disagreeable odor. Stronger solutions must be used, in proportion to the amount of filth to be disinfected. Either of these disinfectants may be used, or a pound and a half of sulphate of iron to a gallon of water. The latter is very cheap and may be freely applied to filthy drains, vaults, gutters, sewers, etc. Chloride of iron is one of the best disinfectants for that purpose, but expensive. The waste chlorides of commerce answer very well.